

Lesson 29: Solving Radical Equations

Classwork

Example 1

Solve the equation $6 = x + \sqrt{x}$.

Exercises 1–4

Solve.

1. $3x = 1 + 2\sqrt{x}$

2. $3 = 4\sqrt{x} - x$

3. $\sqrt{x+5} = x-1$

4. $\sqrt{3x+7} + 2\sqrt{x-8} = 0$

Example 2

Solve the equation $\sqrt{x} + \sqrt{x+3} = 3$

Exercises 5–6

Solve the following equations.

5. $\sqrt{x-3} + \sqrt{x+5} = 4$

6. $3 + \sqrt{x} = \sqrt{x+81}$

Lesson Summary

If $a = b$ and n is an integer, then $a^n = b^n$. However, the converse is not necessarily true. The statement $a^n = b^n$ does not imply that $a = b$. Therefore, it is necessary to check for extraneous solutions when both sides of an equation are raised to an exponent.

Problem Set

Solve.

1. $\sqrt{2x-5} - \sqrt{x+6} = 0$

2. $\sqrt{2x-5} + \sqrt{x+6} = 0$

3. $\sqrt{x-5} - \sqrt{x+6} = 2$

4. $\sqrt{2x-5} - \sqrt{x+6} = 2$

5. $\sqrt{x+4} = 3 - \sqrt{x}$

6. $\sqrt{x+4} = 3 + \sqrt{x}$

7. $\sqrt{x+3} = \sqrt{5x+6} - 3$

8. $\sqrt{2x+1} = x - 1$

9. $\sqrt{x+12} + \sqrt{x} = 6$

10. $2\sqrt{x} = 1 - \sqrt{4x-1}$

11. $2x = \sqrt{4x-1}$

12. $\sqrt{4x-1} = 2 - 2x$

13. $x + 2 = 4\sqrt{x-2}$

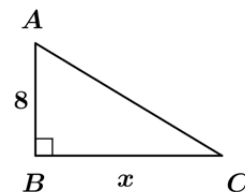
14. $\sqrt{2x-8} + \sqrt{3x-12} = 0$

15. $x = 2\sqrt{x-4} + 4$

16. $x - 2 = \sqrt{9x-36}$

17. Consider the right triangle ABC shown to the right, with $AB = 8$ and $BC = x$.

- Write an expression for the length of the hypotenuse in terms of x .
- Find the value of x for which $AC - AB = 9$.

18. Consider the right triangle ABC shown to the right, where $AD = DC$ and \overline{BD} is the altitude of the triangle.

- If the length of \overline{BD} is x cm and the length of \overline{AC} is 18 cm, write an expression for the lengths of \overline{AB} and \overline{BC} in terms of x .
- Write an expression for the perimeter of $\triangle ABC$ in terms of x .
- Find the value of x for which the perimeter of $\triangle ABC$ is equal to 38 cm.

